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Significance of metacarbonate rocks in unraveling the formation of Central Asian Orogenic Belt

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Metacarbonate rocks are key rock units in orogenic belts because they represent possible remnants of oceanic sediments. Furthermore, they provide important information regarding the fluid-rock history during metamorphism. Central Asian Orogenic Belt (CAOB) consists of several subduction-accretion complexes formed between 1000 Ma and 250 Ma. Metamorphic rocks in this region are important not only in understanding the tectonic evolution of the CAOB, but also can give important clues in understanding the formation of Asian continent. During the Japan-Mongolia Joint Geological Research we have collected several key rock units from the western and northwestern regions of Mongolia. Here we present carbon and oxygen stable isotope characteristics of metacarbonate rocks from the several localities of Central Asian Orogenic Belt of Mongolia. Metacarbonate rocks are common in the CAOB and occur as comparatively thin layers intercalated with pelitic and psammitic gneisses.

Carbon and oxygen isotope studies on metacarbonate rocks shows a large spread in isotope values among different belts within the CAOB. However, the coupled C-O isotope trend can be broadly grouped into two categories. (1) Metacarbonate rocks that preserve pre-metamorphic stable isotope signatures, and (2) those affected by fluid ? rock interaction processes during metamorphism. In the first case, we were able to obtain carbon and oxygen isotopic composition that might be representative of sedimentary signatures, although isotopic shifts caused by the exchange of carbon isotopes with graphite derived from organic material is present in some samples. The equilibrium between calcite and graphite in such samples were used to understand the temperature of metamorphism in such samples. In the second case, we have got large coupled carbon and oxygen isotope shifts which are indicative of fluid-rock interaction during metamorphism. Such samples helped to understand the role of fluids during subduction-accretion processes during the formation of CAOB.

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